

REMARKS

Claims 1-20 are pending.

Claims 1-20 were rejected.

The drawings were approved.

Claims 1-4, 6, 12, 14-15 were rejected under 35 U.S.C. § 102(b) as being anticipated by Skutta et al.

Claims 7-10, 13 were rejected under 35 U.S.C. 103 as being unpatentable over Skutta et al.

Claims 5, 11, 16 were rejected under 35 U.S.C. 103 as being unpatentable over Skutta et al, in view of Tahernia et al.

Claims 17-19 were rejected under 35 U.S.C. 103 as being unpatentable over DeLuca et al, in view of Skutta et al.

Claim 20 was rejected under 35 U.S.C. 103 as being unpatentable over DeLuca et al, in view of Skutta et al and Tahernia et al.

Claims 2 and 8 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention.

The specification was objected to under 35 U.S.C. § 112, first paragraph, as failing to provide an adequate written description of the invention.

Claims 7, 13, 18 were rejected under 35 U.S.C. § 112, first paragraph, for reasons set forth in the objection to the specification.

I. RESPONSE TO OFFICE ACTION

In response to the office action, claims 1-7, and 10-20 were amended. Claims 8 and 9 were cancelled. New claims 21 and 22 were added.

In response to the Examiner's inquiry and the Applicant's obligation under 35 U.S.C. 1.56 and further in compliance with 35 U.S.C. par. 102 (f) and (g) and 35 U.S.C. 103, the subject matter of the various claims was commonly owned at the time the invention was made.

II. DISCUSSION OF CITED PRIOR ART

U.S. Patent No. 4,545,072 to Skutta, et al entitled "Method and Apparatus for Eliminating Interference Due to Spurious Signals Generated in Synthesized Receivers" describes in column 2, lines 12-22, "a synthesizer including circuitry responsive to a control signal for varying the frequency of first and second synthesizer signals by a pre-selected multiple of the reference signal, circuitry for generating an input signal indicating that spurious signal modulation is present, and control circuitry responsive to the input signal for generating the control signal in order to change the frequency of first and second synthesizer signals such that the spurious signal modulation, or whistler spur, is shifted outside the passband of the second filter."

It is important to note that Skutta discloses a method and apparatus for shifting the first IF frequency a small amount about a nominal value in response to detection of a spurious signal in received audio. Skutta does not disclose or imply shifting the center frequency of the first IF filter 104 in accordance with the shifted first IF frequency, thus disadvantageously requiring the first IF filter 104 to have a broader passband than would otherwise

be necessary. The broader passband can degrade signal to noise ratio of the receiver.

Skutta further discloses in column 4, lines 63-66, that "Changing the frequency of VCO's 120 and 140 by 3.2 kHz shifts the first IF frequency up or down by 3.2 kHz, while keeping the second IF frequency constant at 11.4 mHz." The fact that Skutta holds the second IF frequency constant is a second important consideration.

Thirdly, Skutta discloses eliminating the whistler spur only after the whistler spur has occurred with sufficient strength to be detected by a user or by an electronic detector, e.g., a sinad measuring device. Skutta states in column 5, lines 57-59, that "However, some whistler spurs that are audible to the human ear may not be detected by detector 182 since they have a relatively low voltage level." Skutta does not disclose or imply any means for predicting and eliminating an undesirable spurious signal prior to the actual occurrence of the undesirable spurious signal.

U.S. Patent No. 5,058,204 to Tahernia, et al entitled "Synthesized Selective Call Receiver Having Variable Characteristics" discloses a selective call receiver that utilizes a variable low-pass filter to control lock time of a phase-locked loop in response to switching from a first receive frequency to a second receive frequency.

U.S. Patent No. 4,879,758 to DeLuca, et al entitled "Communication Receiver System Having a Decoder Operating at Variable Frequencies" discloses a paging receiver and a method for minimizing spurious interference signals in the radio frequency (RF) stages and the intermediate frequency (IF) stages. The receiver and the method minimize the spurious interference signals by varying a timing signal used by a microprocessor and a voltage converter such that spurious signals generated therein fall outside passband limits of the IF stages.

U.S. Patent No. 4,661,995 to Kashiwagi entitled "Multi-Superheterodyne Receiver" discloses a receiver which minimizes spurious signals by shifting first IF frequency

in response to a potential spurious signal, while maintaining second IF frequency constant.

U.S. Patent No. 4,551,856 to Victor, et al entitled "Synthesized Multiple Conversion Receiver System with Provision for Avoiding Receiver Self-Quiting Spurious Response" discloses a receiver which selects between high side and low side injection to avoid receiver self-quieting spurious signals, while maintaining first and second IF frequencies constant.

III. Rejection under 35 U.S.C. 102b

Claims 1-4, 6, 12, 14-15 were amended to remedy the rejection under 35 U.S.C. 102b as being anticipated by Skudda et al. Elements (a) and (b) of independent Claim 1 as amended recite "(a) selecting one of the plurality of predetermined selectable receive frequencies; and (b) selecting prior to generation of any undesirable spurious frequency one of the at least two predetermined second intermediate frequencies to be the operating second intermediate frequency for the second IF circuit in response to step (a), wherein the operating second intermediate frequency is selected such that substantially all undesirable spurious frequencies generated will fall outside of the passband of the second IF circuit." Independent Claim 12 was amended in a parallel manner.

As noted herein above, Skutta discloses changing the first IF frequency in response to detecting the presence of a spurious signal. Applicants believe that Claims 1 and 12 as amended are not anticipated by Skutta, because Claims 1 and 12 as amended recite changing the second intermediate frequency instead of changing the first intermediate frequency, and because the second intermediate frequency is changed in response to a selected receive frequency and prior to the generation of any undesirable spurious frequency. Changing the second IF frequency instead of the first is advantageous because it eliminates the requirement of (1) using both high-side and low-side injection to generate the first IF and eliminate undesirable spurious

frequencies while maintaining a constant first IF frequency, as in the Victor reference, or (2) slightly detuning the first IF frequency away from the first IF crystal filter frequency, as Skutta does.

As discussed in the Background of the Invention of the present application, using both high-side and low-side injection has associated filtering problems. Alternatively, slightly detuning the first IF frequency away from the first IF crystal filter frequency can degrade signal to noise ratio of the receiver because of the wider passband required for the first IF crystal filter. Conversely, changing the second IF frequency as is done in the present invention can be accomplished without widening the passband of the second IF.

Dependent Claim 2 was amended to claim generation of an operating first intermediate frequency for the first IF circuit only by low-side injection. Dependent Claims 3, 4, and 6 were amended in accordance with amended Claims 1 and 2. Dependent Claims 14-15 were amended in accordance with amended Claim 12. As Claims 2-4, and 6 depend from Claim 1, and as Claims 14-15 depend from Claim 12, Applicants now believe Claims 1-4, 6, 12, and 14-15 are in condition for allowance.

IV. Rejection under 35 U.S.C. 103

Claims 7, 10, and 13 were amended, and Claims 8 and 9 were cancelled to remedy the rejection under U.S.C. 103 as being unpatentable over Skudda et al. Claims 7 and 10 were amended in accordance with Claim 1 as amended. Claim 13 was amended in accordance with Claim 12 as amended. As Claims 7 and 10 depend ultimately from Claim 1, and as Claim 13 depends from Claim 12, Applicants now believe that Claims 7, 10, and 13 are in condition for allowance.

Claims 5, 11, and 16 were rejected under U.S.C. 103 as being unpatentable over Skudda et al in view of Tahernia et al. Claims 5 and 11 depend ultimately from Claim 1 and have been amended in accordance with Claim 1 as amended. Claim 16 depends from Claim 12 and has been amended in

accordance with Claim 12 as amended. For the reasons stated in Section III above, Claims 1 and 12 as amended are now believed to be in condition for allowance. In addition, Tahernia discloses a variable low-pass filter for varying the response time of a phase-locked loop. Tahernia does not disclose or imply the use of a second IF filter having a passband capable of being centered on at least two predetermined intermediate frequencies to cause undesirable spurious frequencies to fall outside of the passband of a second IF circuit. The dependent Claims 5, 11, and 16 as amended are thus believed to be in condition for allowance.

Claims 17-19 were rejected under U.S.C. 103 as being unpatentable over DeLuca et al in view of Skudda et al. Independent Claim 17 was amended in a manner parallel to amended Claim 12 to remedy the rejection. For the reasons stated in Section III above, Applicants submit that the Skudda reference does not disclose the controller of Claim 17 as amended. Nor does the DeLuca reference, as noted by the Examiner in the subject office action. As Claims 18 and 19 depend from Claim 17, Claims 17-19 as amended are now believed to be in condition for allowance.

Claim 20 was rejected under U.S.C. 103 as being unpatentable over DeLuca et al in view of Skudda et al as applied to Claim 17, and further in view of Tahernia et al. For the reasons stated above in regard to these three references, and because Claim 20 depends from Claim 17 and has been amended in accordance with Claim 17 as amended, Claim 20 as amended is now believed to be in condition for allowance.

Rejection under 35 U.S.C. 112, Second Paragraph

Claim 2 was amended, and Claim 8 was cancelled to remedy the rejection under 35 U.S.C. 112, second paragraph for failing to particularly point out and distinctly claim the subject matter which the Applicants' regard as the invention. The amended claim is believed to recite the invention in a clear and definite manner clearly distinguishing from the prior art of record.

Rejection under 35 U.S.C. 112, First Paragraph

The specification was objected to under U.S.C. 112, first paragraph, as failing to provide an adequate written description of the invention.

The generation of undesirable spurious, self-quieting signals in multiconversion heterodyne receivers is well known to one of ordinary skill in the art. Additionally, the subject of self-quieting spurs was described in the Background of the Invention of the instant application on page 3, lines 14-34. When a receive frequency, a first IF frequency, and a second IF frequency are known, simple calculations as shown in the example in the Background can reveal whether the combination of frequencies will generate a spurious signal that falls within the passband of the second IF. If so, by selecting a different center frequency for the second IF such that the spurious signal is removed from the passband of the second IF, as described and claimed by the Applicants, the self-quieting effect of the signal is advantageously eliminated without having to resort to the conventional use of high side injection and its associated filtering difficulties.

The "frequency determining device" in the case of the selection of an operating receive frequency comprises the controls 106. (See page 12, lines 25-31 of the specification.) The "frequency determining device" in the case of the selection of an operating second intermediate frequency comprises the microprocessor 108 in combination with the pre-programmed database 112. (See page 6, line 31 through page 7, line 8 of the specification.)

Claims 7, 13, and 18 were rejected under U.S.C. 112, first paragraph, for the reasons set forth in the objection to the specification. Claims 7, 13, and 18 have been amended. The amended claims are believed to recite the invention in a clear and definite manner in accordance with the specification and to clearly distinguish from the prior art of record.


The patents cited as being of interest, but not applied, have been carefully reviewed and are deemed not to anticipate nor to make obvious, taken singly or in combination, Applicants' claimed invention.

Dependent Claims 21 and 22 are new, and were added to replace cancelled Claims 8 and 9. As the total number of independent and dependent claims pending in the application remains unchanged, Applicants believe no additional fees are due. If Applicants are mistaken, please charge any additional fees, or credit overpayment to Deposit Account No. 13-4778.

With this amendment, the application is believed to be in condition for allowance and a favorable response at an early date is earnestly solicited.

Respectfully submitted,
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